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(54) TWO CYLINDER ONE PIECE PIN STRIPPING DEVICE

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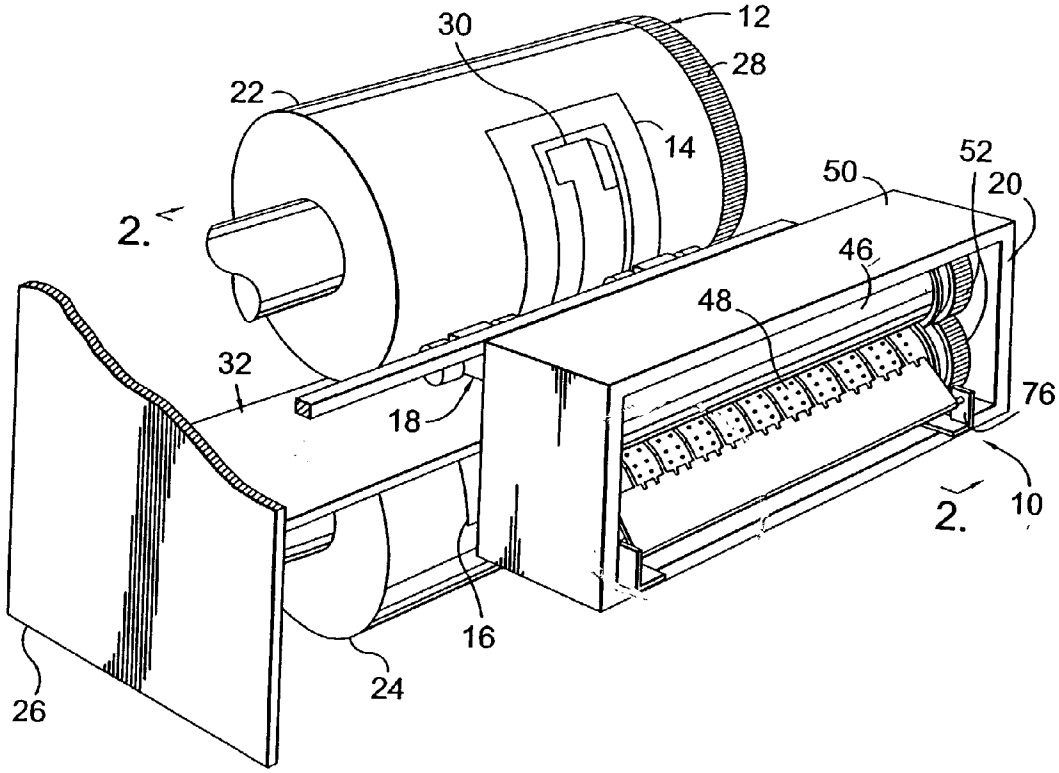
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(57) ABSTRACT

A device used to separate and discard a skeleton formed when a blank is cut into the pattern of a folding carton, envelope, or other desired shape is provided. The device includes first and second separating cylinders. The second separating cylinder includes at least one protrusion extending from the surface thereof, and also has at least one recess formed therein. The protrusions are used to couple the skeleton to the second cylinder. The device further includes a stripping plate having a leading edge positioned near the second cylinder. At least one stripping finger extends from the edge of the stripping plate and within the recess of the second cylinder. The stripping finger is thereby positioned between the second cylinder and the skeleton as the second cylinder rotates toward the stripping finger. The stripping finger operates to disengage the skeleton from the protrusions, thereby stripping the skeleton from the second cylinder.



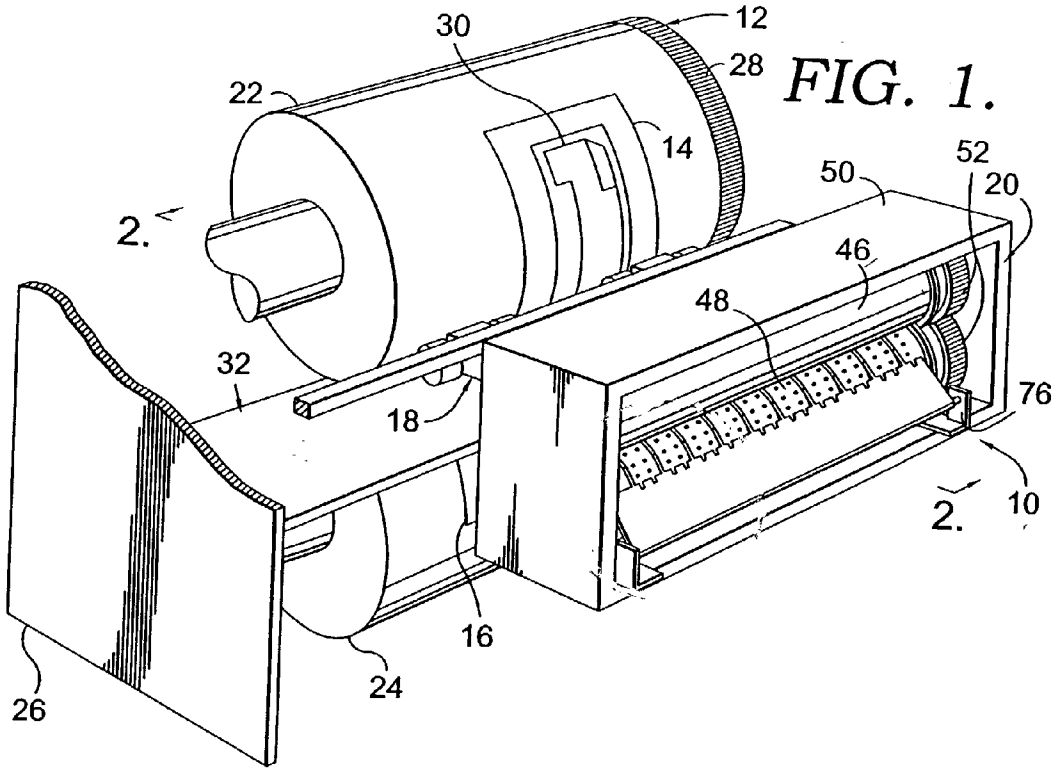

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FIG. 1.

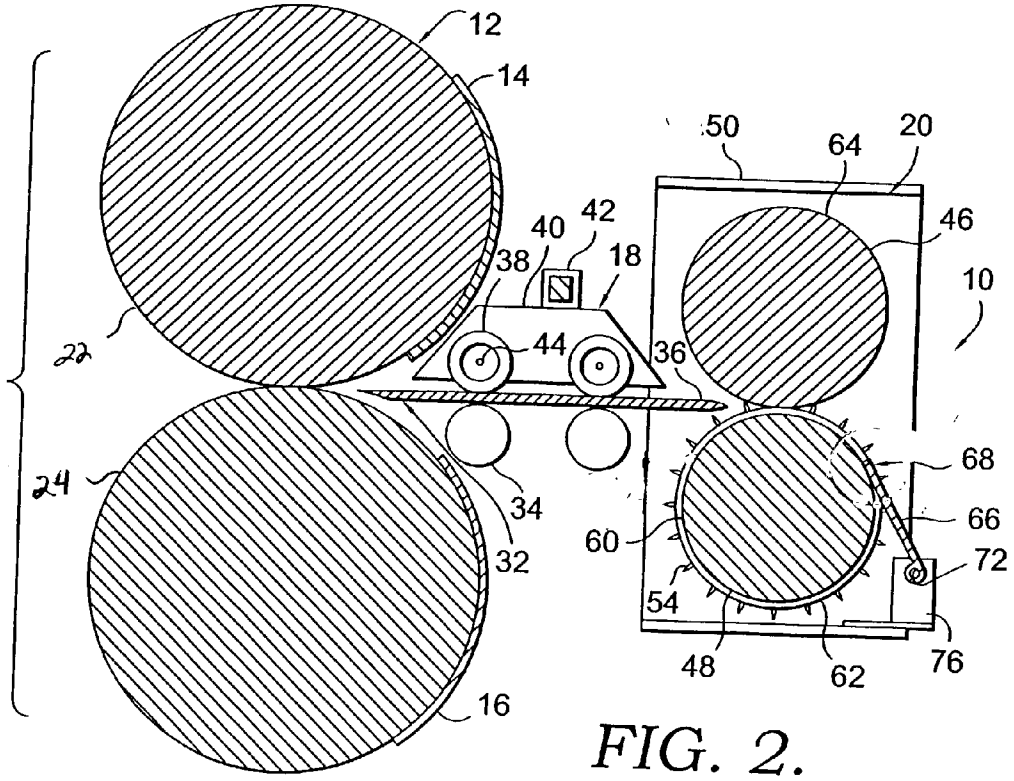

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FIG. 2.

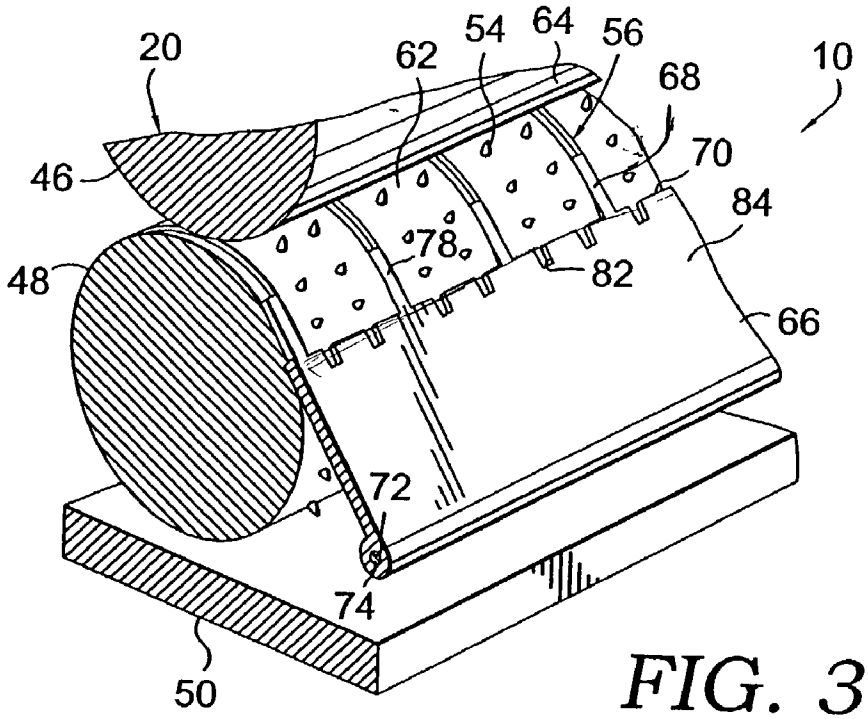


FIG. 3.

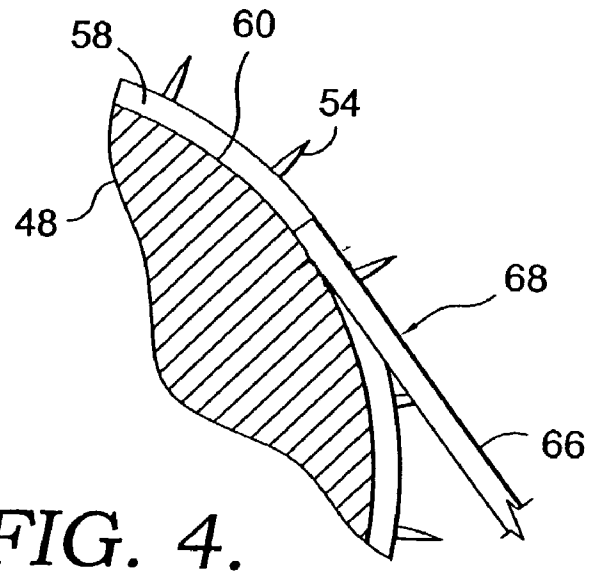


FIG. 4.

TWO CYLINDER ONE PIECE PIN STRIPPING DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable.

BACKGROUND OF THE INVENTION

[0003] The present invention relates to a separating device comprising two cylinders and a one piece pin stripping device. In particular, this invention relates to a device having a stripping plate with fingers adapted to extend within a groove formed in the surface of one of the separating cylinders, whereby waste material coupled to one of the cylinders by the one-piece pin during the formation of a folding carton, envelope or other pattern from a blank can be stripped from the cylinder.

[0004] In manufacturing folding cartons, envelopes or other similar items from a blank, a waste product or skeleton is typically produced. Generally, the blank is first cut into the pattern of the folding carton, envelope or other desired pattern using a die or other type of cutting device. After the pattern is cut, a skeleton remains surrounding the pattern or within the pattern if a window portion is incorporated into the folding carton. To separate the skeleton from the pattern using the devices of the prior art, both the skeleton and pattern are fed into a separating mechanism. The separating mechanism typically includes an upper and a lower cylinder, with the lower cylinder having a plurality of pins extending therefrom. As the skeleton is fed between the cylinders, the pins are arranged to penetrate and thereby couple the skeleton to the lower cylinder, while the pattern advances through the manufacturing process. The skeleton is then removed from the lower cylinder using a stripping plate. In particular, the stripping plate of the prior art is positioned adjacent the surface of the lower cylinder, leaving a narrow gap between the stripping plate and the lower cylinder. As the lower cylinder rotates with the skeleton coupled thereon, the leading edge of the stripping plate is oriented to catch the edge of the skeleton and thereby strip the skeleton from the pins as the cylinder continues to rotate.

[0005] This prior art stripping device suffers from a number of drawbacks and deficiencies. For instance, the skeleton frequently gets jammed in between the stripping plate and cylinder due to the failure of the stripping plate to effectively remove the skeleton from the all of the pins. At times during the separating process, one or more portions of the skeleton may be curled and positioned relatively close to the lower cylinder as it approaches the stripping plate, such that the stripping plate is not always positioned to catch the leading edges of all of the portions of the skeleton. Therefore, the stripping plate may strip some portions of the skeleton, while other portions remain coupled to the lower cylinder. This non-uniform stripping of the skeleton can cause it to jam between the stripping plate and lower cylinder. Jammed skeletons can cause the manufacturing process to shut down until the problem is corrected. Further, with the prior art devices, when portions of the skeletons remain coupled with the cylinder, multiple skeletons can accumulate on the lower cylinder, eventually reducing the effectiveness of the pin stripping method. Accordingly, such unwanted build-up of skeletons can also force the manufacturing process to be suspended while the waste products are removed. Thus, the use of the prior art stripping plates often results in delays in manufacturing and resultant increases in production costs.

[0006] Accordingly, there remains a need for a device that will effectively and completely strip a paper waste product from a two cylinder, one-piece pin assembly without the waste product becoming jammed between the separating cylinder and stripping plate. The present invention fills these needs as well as various other needs.

BRIEF SUMMARY OF THE INVENTION

[0007] In order to overcome the above-stated problems and limitations, and to achieve the noted objects, there is provided a device that is used to discard a skeleton formed when a folding carton, envelope or other type of pattern is cut from a blank.

[0008] In general, the device includes first and second separating cylinders. The second separating cylinder has at least one and typically a plurality of protrusions extending from its surface, and at least one recess formed in the surface thereof. The protrusions are used to pierce and thereby couple the skeleton to the second separating cylinder. The device further includes a stripping plate having a leading edge positioned near the second separating cylinder. At least one stripping finger extends from the edge of the stripping plate and is positioned to correspond with and fit essentially within the recess of the second separating cylinder. As the second separating cylinder advances the skeleton toward the stripping plate, the stripping finger is positioned between the second separating cylinder and the skeleton to catch an edge of the skeleton and remove or strip it from the protrusions on the second separating cylinder.

[0009] Additionally, the stripping plate may include at least one slot formed in the leading edge, which slot is aligned to fit around a corresponding protrusion extending from the second cylinder, allowing the plate to pass over the protrusions without coming into contact with the same.

[0010] Further objects, features, and advantages of the present invention over the prior art will become apparent from the detailed description of the drawings which follow, when considered with the attached figures.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0011] In the accompanying drawings which form a part of the specification and are to be read in conjunction therewith and in which like reference numerals are employed to indicate like parts in the various views:

[0012] **FIG. 1** is a perspective view having portions broken away to show a cutting mechanism, and a separating mechanism and a stripping device according to the present invention;

[0013] **FIG. 2** is an enlarged cross-sectional view taken along line **2-2** of **FIG. 1** showing the cutting mechanism, the separating mechanism and the stripping device;

[0014] **FIG. 3** is an enlarged fragmentary perspective view of the stripping device detailing a plurality of stripping fingers extending within a plurality of corresponding grooves formed in a portion of the separating mechanism; and

[0015] **FIG. 4** is an enlarged fragmentary cross-sectional view of one of the stripping fingers positioned within a corresponding one of the grooves on a bottom separating cylinder.

DETAILED DESCRIPTION OF THE INVENTION

[0016] Referring now to the drawings in detail, and initially to **FIG. 1**, numeral **10** generally designates a stripping device constructed in accordance with a first preferred embodiment of the present invention. A blank or web is typically fed into a cutting mechanism **12** where a male and female die **14, 16** cut the blank in the shape of a folding carton, envelope, or other desired pattern. When the desired pattern is formed, a skeleton or waste portion surrounding the pattern remains. In some cases, a portion of the skeleton may also be located within the periphery of the pattern, for example, if a window portion is to be included in the pattern. An intermediate guide roller assembly **18** is used to maintain the position of the pattern and skeleton relative to one another as they advance from the cutting mechanism **12** to a separating mechanism **20**. Separating mechanism **20** then separates the skeleton from the pattern by coupling the skeleton to a part of separating mechanism **20**, after which it is removed by stripping device **10**.

[0017] As best seen in **FIGS. 1 and 2**, cutting mechanism **12** includes top and bottom rolls **22, 24** that are rotatably mounted to a main housing **26**, which remains stationary throughout the manufacturing process. Top and bottom rolls **22, 24** are disposed in a manner which allows them to rotate with respect to each other, and are separated from one another at a distance which allows the blank or web to pass therebetween while being cut by the dies **14, 16**, as will be discussed below. In one embodiment, rolls **22, 24** include a plurality of splines **28** radially disposed about one circumferential edge of each roll, whereby the splines **28** of each roll **22, 24** engage each other and thereby rotate the rolls **22, 24** with respect to each other. However, the manner by which the top and bottom rolls **22,24** rotate can be any suitable method for rotation. Typically, rolls **22, 24** are formed of a magnetic material for coupling male and female dies **14, 16**, respectively, thereto. It will be understood and appreciated that any suitable mechanical fasteners, adhesives or the like may alternatively be used to couple dies **14, 16** to rolls **22, 24**.

[0018] Dies **14, 16** are generally used to cut the blank or web into the pattern or shape of the folding carton, envelope, or other desired product. In particular, male die **14** includes a raised peripheral portion **30** arranged in the shape of the desired pattern. Female die **16** has a corresponding raised portion which extends from its surface and includes a medial channel therewithin, which medial channel is adapted to receive raised portion **30** when the two dies **14, 16** converge to cut the blank. In use, when the blank passes between dies **14, 16**, the desired pattern is cut into the blank as the peripheral portion **30** of die **14** is received in the corresponding medial channel of die **16**.

[0019] Positioned between the cutting mechanism **12** and the separating mechanism **20** are an intermediate guide roll assembly **18** and a support plate **32** which are adapted to support the pattern and skeleton as they advance therebetween. Support plate **32** is mounted to housing **26** above a pair of supports **34**. Typically, two intermediate guide roller assemblies **18** are used, although it will be understood that the number of guide roller assemblies may vary depending on the width of the blank used in the manufacturing process and other considerations. As best seen in **FIG. 2**, each intermediate guide roller assembly **18** includes a set of guide rollers **38**, a carriage **40** and an intermediate mounting member **42** positioned on top of carriage **40**, by which assembly **18** is mounted to housing **26**. Carriage **40** further includes a pair of axles **44** on which guide rollers **38** are mounted. Intermediate guide roller assembly **18** and support plate **32** are positioned to contact or be slightly spaced from each other, permitting the pattern and skeleton to pass securely therebetween without separating as they advance from the cutting mechanism **12** to the separating mechanism **20**.

[0020] As best seen in **FIGS. 1 and 2**, separating mechanism **20** includes top and bottom separating cylinders **46, 48** rotatably mounted to a secondary housing **50**, which remains stationary throughout the manufacturing process. Top and bottom cylinders **46, 48** are separated from one another at a distance that will allow the pattern and skeleton to pass therebetween as they advance from intermediate guide roller assembly **18**. Cylinders **46,48** are further disposed in a manner which allows them to rotate with respect to each other. In one embodiment, cylinders **46, 48** include a plurality of splines **52** radially disposed about one circumferential edge of each cylinder, whereby the splines **52** of each cylinder **46,48** engage each other and allow the cylinders **46,48** to rotate with respect to each other. It is understood that any suitable means for causing cylinders **46, 48** to rotate would be within the scope of this invention.

[0021] Bottom separating cylinder **48** has at least one and generally a plurality of protrusions extending from the surface thereof for coupling the skeleton thereto, as will be discussed in detail below. In one embodiment, at least one and generally a plurality of apertures are formed in the surface of cylinder **48**, wherein each aperture is adapted to receive a corresponding protrusion therethrough. The protrusions can be individual pins **54** which are adapted to be removably mounted within a corresponding aperture by screwing pin **54** into the aperture. Pins **54** are selectively positioned on bottom cylinder **48** so as to pierce the skeleton as the pattern and skeleton are fed between top and bottom cylinders **46, 48**. It will be understood and appreciated that the selective positioning of pins **54** may be altered by disengaging the pin from its corresponding aperture, and subsequently remounting each pin **54** in a desired aperture. Positioning of the pins **54** depends on, among other factors, the size, shape and location of the skeleton produced by the cutting mechanism **12**. It is further to be understood that, in addition to screwing the pins into the apertures, any suitable method of affixing the pins onto the cylinder can be used and is considered to be within the scope of this invention.

[0022] As best seen in **FIGS. 3 and 4**, bottom separating cylinder **48** also includes one or more grooves or channels **56** formed in the outer surface **62** thereof, which grooves **56** extend circumferentially therearound. These grooves **56** are

adapted to receive a portion of stripping device **10**, as will be described in more detail below. Grooves **56** have a generally U-shaped cross-section having two sidewalls **58** and a lower surface **60**. In particular, sidewalls **58** extend into an outer surface **62** of bottom cylinder **48** and lower surface **60** extends therebetween. It should be understood that grooves having other cross-sectional shapes such as, but not limited to, semi-circle or V-shape are also within the scope of the present invention.

[**0023**] Top separating cylinder **46** has a generally smooth surface **64**. However, it should be understood that surface **64** may preferably include apertures formed therein which are positioned and adapted to receive at least the tips of pins **54** as the pattern and skeleton are fed between top and bottom separating cylinders **46**, **48**. These apertures in surface **64** assist pins **54** in piercing the skeleton.

[**0024**] As best seen in **FIGS. 1 and 2**, stripping device **10** is mounted to secondary housing **50** and is adapted to strip the skeleton from bottom cylinder **48** of separating mechanism **20**. Referring to **FIGS. 3 and 4**, device **10** includes a stripping plate **66** having at least one, and preferably a plurality of stripping fingers **68** extending from a leading edge **70** thereof. Stripping plate **66** can be mounted to secondary housing **50** in any suitable manner. In one embodiment, stripping plate **66** includes a channel or bore **72** extending through the length of a distal edge thereof, and a rod **74** is positioned within the channel **72** to pass therethrough and protrude partially from each end of stripping plate **66** as shown in **FIG. 1**. Each end of rod **74** is adapted to be received by a mounting bracket **76** coupled with secondary housing **50**.

[**0025**] As best seen in **FIG. 4**, each stripping finger **68** is adapted to be received within a corresponding groove **56**. As will be appreciated, stripping plate **66** and bottom cylinder **48** should be positioned so that stripping fingers **68** can extend in to grooves **56**. Further, stripping fingers **68** and grooves **56** should be appropriately sized and shaped so that when stripping fingers **68** are positioned within the grooves **56**, they do not extend any higher than the outer surface **62** of the cylinder **48**. In this manner, stripping fingers **68** can be positioned between bottom cylinder **48** and the skeleton as the skeleton advances toward the stripping device **10**. Stripping plate **66** also preferably includes a number of notches **82** formed in leading edge **70** to allow pins **54** to pass by without coming into contact or interfering with stripping plate **66**.

[**0026**] In operation, a web or blank is first fed through and cut by cutting mechanism **12**.

[**0027**] Specifically, bottom roll **24** is rotated in a clockwise direction by a main drive gear, not shown, which is in turn rotated by a power source. As bottom roll is rotated, the splines **28** on top and bottom rolls **22**, **24** engage each other, and top roll **22** is thereby rotated in a counterclockwise direction. The rotation of top and bottom rolls **22**, **24** operates to feed the web or blank therebetween, and as the dies **14**, **16** come into contact with each other, the blank is cut by the action of raised peripheral portion **30** and the corresponding medial channel of die **16**, thereby forming the desired pattern and the skeleton or waste product. As stated above, the skeleton may surround the pattern, or may also be located within the pattern if a window portion is to be formed in the pattern. It is understood that in certain circumstances, the skeleton may be located solely within the pattern.

[**0028**] The support plate **32** and the intermediate guide roller assembly **18** hold the pattern and skeleton together as they advance between cutting mechanism **12** and the separating mechanism **20**. In particular, the pattern and skeleton are contacted on an upper side by guide rollers **38**, and on a bottom side by support plate **32**. As the pattern and skeleton advance, guide rollers **38** rotate about axles **44** allowing the pattern and skeleton to remain firmly positioned against support plate **32**, while preventing the pattern and skeleton from separating prior to reaching the separating mechanism **20**.

[**0029**] The pattern and skeleton then are fed into separating mechanism **20**. Bottom separating cylinder **44** may rotated in a clockwise direction by the same main drive gear that rotates the top and bottom rolls **22**, **24** in cutting mechanism **12**. Splines **52** on the cylinders **46**,**48** engage each other, and top cylinder **46** is thereby rotated in a counterclockwise direction. The rotation of top and bottom separating cylinders **46**, **48** operates to advance the pattern and skeleton therebetween. Pins **54** then pierce the skeleton, coupling it to bottom separating cylinder **48**. At this point, the pattern and skeleton separate from each other, as the pattern continues to advance through the manufacturing process, while bottom separating cylinder **48** advances the skeleton toward stripping plate **66**.

[**0030**] As described above, each stripping finger **68** is positioned within a corresponding groove **56** while the bottom separating cylinder **48** rotates to thereby advance the skeleton toward stripping plate **66**. As the skeleton approaches leading edge **70** of stripping plate **66**, stripping fingers **68** extending within grooves **56** become positioned between bottom separating cylinder **48** and the skeleton. As the skeleton continues to advance, it proceeds to slide over a top surface **84** of stripping plate **66**, thereby extricating the skeleton from pins **54**. Notches **82** allow pins **54** to pass by stripping plate **66** as the skeleton is being removed from bottom separating cylinder **48**. Once the skeleton is completely disengaged from pins **54**, it advances along top surface **84** of stripping plate **66** and into a waste area.

[**0031**] It can, therefore, be seen that the invention is one that is designed to overcome the drawbacks and deficiencies existing in the prior art. The invention is a stripping device that includes one or more stripping fingers which extend within a corresponding set of grooves formed in a separating-cylinder. The stripping fingers positioned within the grooves so that the skeleton may be stripped from the separating cylinder without jamming between the stripping plate and the separating cylinder. This novel system for removing the waste product from a pattern without jamming the manufacturing line or otherwise causing unwanted delays and additional steps, decreases manufacturing times as well as manufacturing costs associated with the prior art waste removal devices.

[**0032**] While particular embodiments of the invention have been shown, it will be understood, of course, that the invention is not limited thereto, since modifications may be made by those skilled in the art, particularly in light of the foregoing teachings. Reasonable variation and modification

are possible within the scope of the foregoing disclosure of the invention without departing from the spirit of the invention.

What is claimed is:

1. A device for stripping waste material from a separating mechanism, said separating mechanism including first and second separating cylinders, wherein at least one protrusion extends from a surface of said second cylinder to couple the waste material to said second cylinder, and wherein said second cylinder has a recess formed therein, said device comprising:

a stripping plate having a leading edge positioned in close proximity to said second cylinder; and

at least one stripping finger extending from said leading edge of said stripping plate,

wherein at least a portion of said stripping finger extends within said recess formed in said second cylinder, said stripping finger being positioned between said second cylinder and waste material as said second cylinder rotates toward said stripping finger so that the waste material is removed from said protrusions and stripped from said second cylinder.

2. The device as recited in claim 1, wherein said stripping plate has at least one slot formed in said edge which is aligned with said protrusion.

3. The device of claim 1, wherein said recess extends around the circumference of said second cylinder.

4. The device of claim 1, wherein said stripping finger includes top and bottom surfaces, wherein at least a portion of said top surface is positioned within said recess of said second cylinder.

5. The device of claim 1, wherein said protrusion is a one-piece pin.

6. A device for discarding a skeleton produced when a cutting mechanism forms a folding carton or other type of envelope pattern from a blank, said device comprising:

a housing;

a first separating cylinder rotatably mounted to said housing;

a second separating cylinder having an outer surface and being rotatably mounted to said housing, said second separating cylinder positioned at a distance from said first separating cylinder to allow the blank to fit therebetween, said second separating cylinder having a groove formed in said outer surface;

at least one protrusion extending from said outer surface of said second separating cylinder;

a stripping plate coupled with said housing, said stripping plate having an edge with at least one stripping finger extending therefrom, said stripping finger being positioned within said groove,

wherein said protrusion penetrates the skeleton to separate the skeleton from the folding carton pattern, and wherein said stripping finger is positioned between said second separating cylinder and the folding carton pattern to remove the folding carton pattern from said protrusions.

7. The device as recited in claim 6, wherein said stripping plate has at least one slot formed in said edge which is aligned with said protrusion.

8. The device of claim 6, wherein said stripping finger includes top and bottom surfaces, wherein at least a portion of said top surface is positioned below the surface of said second separating cylinder.

9. The device of claim 6, wherein said protrusion is a one-piece pin.

10. A device for separating and stripping waste material from a blank during an envelope or carton manufacturing process, and said device comprising:

a separating mechanism including first and second separating cylinders, wherein at least one protrusion extends from an outer surface of said second cylinder to couple the waste material to said second cylinder, and wherein said second cylinder has a recess formed therein,

a stripping plate having a leading edge positioned in close proximity to said second cylinder; and

at least one stripping finger extending from said leading edge of said stripping plate,

wherein at least a portion of said stripping finger is positioned to extend within a corresponding one of said recesses formed in said second cylinder, said stripping finger being adapted to be positioned between said second cylinder and the waste material as said second cylinder rotates toward said stripping finger so that the waste material is removed from said protrusions and stripped from said second cylinder.

11. The device as recited in claim 10, wherein said stripping plate has at least one slot formed in said edge which is aligned with said protrusion.

12. The device of claim 10, wherein said recess extends around the circumference of said second cylinder.

13. The device of claim 10, wherein said stripping finger includes top and bottom surfaces, wherein at least a portion of said top surface is positioned within said recess of said second cylinder.

14. The device of claim 10, wherein said protrusion is a one-piece pin.

15. A device for discarding a skeleton produced when a cutting mechanism forms a folding carton or other type of envelope pattern from a blank, said device comprising:

a housing;

a first separating cylinder rotatably mounted to said housing;

a second separating cylinder having an outer surface and being rotatably mounted to said housing, said second separating cylinder positioned at a distance from said first separating cylinder to allow the blank to fit therebetween, said second separating cylinder having a groove formed in said outer surface;

holding means for coupling the skeleton with said second separating cylinder and separating the skeleton from the folding carton pattern; and

stripping means positioned within said groove of said second separating cylinder for removing the skeleton from said second separating cylinder.

16. A method for discarding a skeleton formed from cutting a folding carton pattern from a blank, said method comprising:

providing a cutting mechanism;

cutting the blank to form the pattern and the skeleton;

providing a separating mechanism having first and second cylinders, said second cylinder having an outer surface with a groove formed therein;

moving the pattern and skeleton to said separating mechanism;

providing a stripping plate having an edge with at least one stripping finger extending therefrom;

positioning at least a portion of said stripping finger within said groove;

rotating said first and second separating cylinders to feed the skeleton between said first and second cylinders;

coupling the waste material to said second cylinder to separate the waste material from the folding carton pattern; and

further rotating said first and second separating cylinders so that said stripping finger is positioned between said second cylinder and the skeleton whereby said stripping finger removes the waste material from said second cylinder.

17. The method of claim 16, further comprising:

providing a pin extending from said second separating cylinder; and

using said pin to couple the waste material with said second separating cylinder.

18. The method of claim 16, wherein said stripping finger has top and bottom surfaces, and wherein said stripping finger is positioned within said groove so that at least a portion of said top surface is positioned below the surface of said second separating cylinder.

* * * * *